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**Boletus and Phylloporus in Malaysia:
further notes and descriptions**

by

E. J. H. CORNER

Botany School, University of Cambridge

New taxa:— *Boletus* subgen. *Boletus*, *B. hibiscus* sp. nov. (Sarawak), *B. rubroglutinosus* sp. nov. (Sarawak); subgen. *Leccinum*, *B. peronatus* sp. nov. (Sarawak), *B. squarrosipes* sp. nov. (Malaya); subgen. *Punctispora* subgen. nov., *B. punctisporus* sp. nov. (Sarawak); subgen. *Tylopilus*, *B. longipes* Mass. var. *albus* var. nov. (Sarawak), *B. tristior* sp. nov. (Sarawak); subgen. *Xerocomus*, *B. albipurpureus* sp. nov. (Sarawak), *B. setigerus* sp. nov. (Java). — *Phylloporus squamosus* sp. nov. (Sarawak), *P. stenoporus* sp. nov. (Java).

In the week of 21 August 1917 C. F. Baker and N. Patouillard had the luck to encounter a run of boleti in the Gardens' Jungle in Singapore. They described 16 new species but, as many of these had already been collected by H. N. Ridley and described by Massee, merely five of their names have survived (Corner 1972). During the week 20–27 August 1972 I had the luck to encounter a similar run of boleti in Sarawak about the neighbourhood of Kuching, especially in Bako National Park. I record 20 species of which six appear to be new. These and a few others from Malaya and Java are here described. So it is that every region of south-east Asia adds to our knowledge of boleti.

The weather in Malaysia had been exceptionally dry from May or June 1972 until the beginning of August; in places there had been water-rationing. Heavy showers then induced this first crop of agarics which began around Kuching on 19 August with boleti and *Cantharellus* and passed on to *Amanita*, *Russula* and *Entoloma*. In early September I had to leave on my homeward journey via Ceylon where a similar dry period had extended until about 12 September. The monsoon broke at this date when I was in Polunarawa. Unfortunately I could not delay, but I wondered what fungi would come up in the extensive, if mainly secondary, forests that are around this ancient town; the region is unexplored mycologically. Many trees at Polunarawa had already begun to develop new leaves in anticipation, as it were, of the rains which had ceased in the middle of March; the parched scene was set for the mycologist, and it struck me as a good occasion for gasteromycetes.

In Sarawak I was particularly interested in the fungi of Bako National Park because it consists largely of the xerophilous *kerangas* forest on sandstone with a few small valleys of typical lowland dipterocarp forest. Yet I could find no marked difference between the fungous floras of these very different kinds of forest. The species of *Boletus* and *Amanita* seemed to occur indiscriminately. Many were widely distributed species of lowland West Malaysia and Singapore which are without *kerangas* forest.

I draw attention to *Boletus hibiscus* as a massive ally of *B. (Phaeogyroporus) portentosus* which has not been reported from Malaysia, to *B. punctisporus* as an ally of the North American *B. betula*, to *B. setigerus* as yet another small species with thick-walled cystidia, and to the two new species which I assign to subgen. *Leccinum* for they relate with *B. borneensis* which I have described from Kinabalu (Corner 1972).

BOLETUS Fr.

subgen. *Austroboletus* Corner

B. dictyotus (Boedijn) Corner

var. *morchellipes* Corner (1972) p. 85.

Pileus 7–17 cm wide, conical then convex to more or less plane, fawn ochraceous felted, dry, becoming cracked; margin at first extensively appendiculate and in unopened fruit-bodies concrescent with the upper ridges of the stem-reticulum, but sometimes detaching from the pileus as a more or less broken ring. Stem 8–15 cm × 7–25 mm (excluding the reticulum), subcylindric, white, coarsely alveolate-reticulate downwards, the meshes towards the base of the stem 5–15 mm deep. Tubes 12–20 mm long, white then vinaceous pink, soft; pores 0.5–2 mm wide, white then vinaceous pink. Flesh 20–35 mm thick in the centre of the pileus, white, unchanging, but yellowish at the base of the stem with age. Spores 12–15.5 × 5–6 μ (spore-body), with small warts 0.5–1 μ high, both ends of the spore smooth.

Sarawak, Bako National Park, scattered in the humus, rarely two together, in *kerangas* and lowland dipterocarp forest, Corner P-147, 25 Aug. 1972.—Malaya, Pahang, Fraser's Hill, Corner s.n., 6 Sept. 1972.

This with its massive spongy stem is one of the more striking species of Malaysia. It was common at Bako and the fruit-bodies were eaten by squirrels.

B. malaccensis (Pat. et Baker) Corner (1972) p. 85.

Pileus without marginal veil. Stem –9 cm high, attenuate upwards from the fusiform base, in the lower third with shallow, very elongate meshes –25 × 4 mm and 1–1.5 mm deep, wholly minutely yellowish pruinose. Spores 10.5–13(–14) × 4.7–5.5 μ . Basidia 27–34 × 10–11 μ ; sterigmata 4, 6–8 μ long. Tube-trama becoming sloppy-gelatinous in alcohol-formalin.

Sarawak, Bako National Park, solitary in humus, Corner P-158, 26 Aug. 1972.

This collection agreed closely with those from Singapore.

B. mucosus Corner (1972) p. 77.

Sarawak, Bako National Park, common in all inland parts whether in *kerangas* forest or not.

The young fruit-bodies had the margin of the pileus extended into a flange, as in *B. longicollis*, and disrupting to make a broken annulus on the reticulate stem.

B. rubiicolor Corner (1972) p. 86.

Pileus -6 cm wide, minutely rufous madder or purple madder squamulose; margin appendiculate -15 mm long, disrupting into fragments or collapsing on to the stem. Stem 13-15 cm \times 7-8 mm at the apex, 10-15 mm at the subclavate base, white, finely reticulate at the apex, coarsely and rather shallowly costato-reticulate downwards with elongate meshes 10-17 \times 2-4 mm, 1-3.5 mm deep, most pronounced about the middle of the stem. Tubes -20 mm long; pores 1-1.3 mm wide. Flesh -13 mm thick in the centre of the pileus, soft, sappy, easily putrescent, unchanging.

Except for the much larger fruit-bodies with pronounced marginal flange to the pileus and rather strongly lacunoso-reticulate stem, the collections agreed with previous ones from Singapore. This appears to be one of the very early species to fructify at the beginning of a fungous season.

Sarawak, Kuching, Semanggoh Forest, Corner P-91, 19 Aug. 1972; Bako National Park s.n., 26 Aug. 1972, in *kerangas*-humus; solitary, scattered.

subgen. *Boletellus* Murr.

B. ananas Curtis

Sarawak, Bako National Park, in *kerangas*-humus, s.n. 26 Aug. 1972.

B. longicollis Ces.

Sarawak, Bako National Park, in *kerangas*-humus and that of lowland diptero-carp forest, frequent, solitary, 26 Aug. 1972.

subgen. *Boletus*

Boletus hibiscus sp. nov.

Pileus 9-26 cm latus, convexus dein planus et concavus, laevis, siccus, laete cervino-luteus dein (? de sporis depositis) cinnamomeo-ferrugineus; margine flavidus, primo ut membrana 3-4 mm lata tubulos excedenti. Stipes 7-12 cm \times 16-45 mm, cylindricus, firmus dein subcompressus intusque spongiosus, cortice dura, luteus dein e basi fusco-brunnescens, ex integro minute pruinoso-furfuraceus, haud reticulatus; mycelio albo. Tubi 9-12 mm longi, sinuato-ventricosi, pallide cervino-cinnamomei dein cinnamomeo-ferruginei; poris 0.8-1.5 mm latis, angulatis, rugulis longitudinalibus subcompositis, marginem pilei versus saepe radiato-elongatis, concoloribus. Caro in centro pilei 16-35 mm crassa, firma dein spongiosa, flavo-alba, basim stipitis versus dura et intense ochraceo-lutea, sub superficie pilei flava, fractu vix flavescentia vel in stipite subbrunnescens, nec cyanescens nec rubescens. Odor subacidus. Sporae 8-9.5 \times 6.3-7 μ , in cumulo laete ferrugineae (nec olivaceae nec incarnatae), ovoideae, laeves, inamyloideae, 1-guttatae, tunica in KOH subincrassata, apiculo 0.2 μ longo.

Ad terram arenosam maritimam in *Hibisceto tiliaceo*, gregaria, saepe in circulis latis. Sarawak, Bako National Park, Telok Pandan et Telok Bako, 28-29 Sept. 1972, leg. E. J. H. Corner P-181 (typus, CGE).

Pileus bright brownish yellow, becoming cinnamon-ferruginous from the spores; margin exceeding the tubes as a flange 3-4 mm wide. Stem yellow, then fuscous brown from the base upwards, minutely pruinose, firm then somewhat baggy with spongy interior and firm rind. Tubes sinuate, pale brownish cinnamon then ferruginous; pores angular, becoming subcompound with internal longitudinal ridges, concolorous with the tubes. Flesh thick, yellowish especially in the stem, unchanging.

Spores bright ferruginous in the mass. Basidia $30-42 \times 8.5-10\mu$, 4-spored. Cheilocystidia $30-45 \times 4-8\mu$, more or less narrowly ventricose, often with prolonged or bifurcate obtuse apex $2-3\mu$ wide, thin-walled, colourless, as a sterile edge to the pores. Pleurocystidia not seen. Surface of pileus consisting of a disrupted and flattened pile of hyphal ends -100μ long, with submoniliform clamped cells $20-40 \times 7-15\mu$, not encrusted, the end-cells subclavate. Surface of the stem covered by a more or less disrupted and (?) mainly sterile hymenium of immature basidia and cystidia as the cheilocystidia. Tube-trama phylloporoid with long-celled mucilaginous hyphae $4-11\mu$ wide, clamped, becoming rather toughly gelatinous in alcohol-formalin. Hyphae *clamped*, inflating, with scattered oleaginous hyphae in the stem and pileus; in the stem mainly longitudinal with the cells $70-400 \times 5-35\mu$, cylindric or fusiform, thin-walled, with some uninflated interweaving hyphae as laterals of the inflated longitudinal hyphae, but with narrower and more compact hyphae in the firmer cortex; without chlamydospores at the base of the stem.

This striking species is recognised from its large size, bright brownish yellow colour, unchanging flesh, copious ferruginous spore-deposit, and habitat. With clamped hyphae it comes near to *B. portentosus* which differs in the olivaceous fruit-body and spores. The ferruginous spores place the species in *Gyrodon* which, however, has decurrent tubes. *Phaeogyroporus* with olivaceous brown spores has the sinuate-ventricose tubes. To both genera a boletoid tube-trama is ascribed; that of *B. hibiscus* is phylloporoid. According to a collection that I have from Brazil, *Phaeogyroporus tropicus* (Rick) Singer has yellow-brown (not olivaceous) spores, phylloporoid trama, and adnexed or tapered-adnate tubes. Therefore, while the distinction of these imperfectly characterised genera (including *Phlebopus*) is so uncertain, I retain the species in *Boletus* near to *B. portentosus* and *B. tropicalis*.

I found about 150 fruit-bodies of *B. hibiscus* in two forested bays of Bako National Park. They grew in more or less complete circles up to 5 m in diameter in thickets of *Hibiscus tiliaceus*, *Dillenia suffruticosa*, *Planchonella* and *Pandanus odoratissimus*, not directly on the sea-front but where this vegetation borders the outlets of mangrove-streams. It was impossible to associate these circles with any particular tree or, indeed, to trace the mycelium beyond the lowest level of the humus where it mixed with the sand. The fungus did not grow with *Rhizophora*, *Bruguiera* or *Sonneratia* or in the muddy ground of the palms *Oncosperma* and *Salacca*.

B. hibiscus comes in the artificial key to Malaysian boleti (Corner 1972, p. 49), next to *B. chlamydosporus*.

B. rubroglutinosus sp. nov.

Pileus 4.5-6 cm latus, sanguineo-ruber, glutinosus. Stipes 6-7 cm \times 9 mm, cylindricus, concolor, rubro-pruinosus, ad basim mycelio ochraceo-aureo vestitus. Tubi 5 mm longi, sinuato-adnati, flavi; poris minutis, sanguineo- vel aurantiaco-rubris, dein sordide aurantiaco-incarnatis. Caro -9 mm crassa, flava, intense cyanescens ut tubi porique. Sporae $9.5-12 \times 3.7-4.5\mu$, in cumulo fusco-purpureae, leniter olivaceotinctae, laeves.

Ad terram in silva. Sarawak, Bako National Park, Corner P-145 (typus, CGE), P-145a, 25-26 Aug. 1972.

Pileus 4.5-6 cm wide, convex (immature), evenly blood-red, smearable-viscid pelliculose. Stem 6-7 cm \times 9 mm, cylindric, dry, blood-red, minutely red scurfy-pruinoose, not reticulate, base slightly tapered and thinly villous with the ochraceous golden-yellow mycelium. Tubes 5 mm long, adnate then sinuate, yellow; pores minute, blood-red or orange-red, then dull orange-pink. Flesh -9 mm thick in

the centre of the pileus, yellow, quickly and intensely cyanescent on bruising or cutting as the tubes and pores. Smell none.

Spores in the mass fuscous purplish tinged olivaceous. Basidia $25-32 \times 9-10\mu$; sterigmata 4. Cheilocystidia $20-40 \times 8-14\mu$, clavate to subventricose or subfusoid, thin-walled, as a sterile edge to the pores. Pleurocystidia $-75 \times 14\mu$, ventricose, thin-walled, with a short appendage 2μ wide, sparse. Surface of the pileus composed of appressed, narrow, colourless mucilage-hyphae $2-3.5\mu$ wide, with cylindric ends, neither as a pile nor as a palisade, without clamps. Surface of the stem with a disrupted and mainly sterile hymenium of clavate sterile basidia, subglobose cells $14-21\mu$ wide, and more or less ventricose cystidia, some with an appendage $-60 \times 2-3\mu$; stem-hyphae $5-16\mu$ wide, without clamps, many secondarily septate. Tube-trama boletoid, swelling and firmly gelatinous in alcohol-formalin, with a narrow medulla of narrow hyphae $3-5\mu$ wide and a cortex of gradually divergent hyphae -9μ wide with strongly mucilaginous walls.

This species is distinguished by the glutinous red pileus, the dry red furfuraceous stem, the minute red pores, the yellow cyanescent flesh, and the yellow mycelium. With boletoid trama and viscid pileus it should go into *Suillus* of modern authors but, among Malaysian boleti, it seems to me related with *B. subreticulatus* and *B. lubricus*, neither of which have cyanescent flesh. It may be rare for I found but two specimens. In the artificial key to Malaysian *Boletus* (Corner 1972, p. 41) it should be entered in Group C after *Heimiella mandarina*.

B. rufo-aureus Mass.

Sarawak, Bako National Park, in *kerangas*-humus, Corner P-182, 28 Aug. 1972.—Malaya, Pahang, Fraser's Hill, Corner s.n., 6 Sept. 1972.

Though large, with the pileus 8–12 cm wide and the stem 11 cm \times 27 mm, the specimens were immature; it is the wont of this species to mature late in development. The few spores that I found were smaller than usual and $9.5-11 \times 3.5-4.2\mu$; cystidia, most basidia, and the hyphal ends on the pileus had not reached their adult size and shape.

B. sinapicolor Corner (1972) p. 124.

Pileus –8 cm wide. Stem poroid-reticulate at the apex, the reticulations elongate and deeper downwards, –0.5 mm deep, but absent from the lower third of the stem. Tubes 7–8 mm long, sinuate; pores 0.5 mm wide. Flesh hard and firm in the stem.

Spores $10.5-12.7 \times 4-4.5\mu$. Basidia $30-37 \times 9-10\mu$; sterigmata (2–3–) 4. Pleurocystidia $-65 \times 9-14\mu$, ventricose with narrow apex, thin-walled, inconspicuous, sparse. Cheilocystidia similar, sparse. Surface of pileus with cells $40-80 \times 7-14\mu$ in the hyphae of the pile, the end-cells clavate or ventricoso-attenuate. Stem-surface with a disrupted sterile hymenium, along the ridges with excrescent 2–3-septate hyphae $-170 \times 7-9\mu$. Stem-hyphae with the cells $-170 \times 7-16\mu$. Tube-trama subboletoid with slight medulla of narrow hyphae, the cortical hyphae $5-13\mu$ wide, becoming somewhat swollen but firm in alcohol-formalin.

Malaya, Pahang, Fraser's Hill, Corner P-201, 6 Sept. 1972, in humus in *Trigonobalanus*-forest.

This collection, from the same valley where I first found the species forty years ago, has enabled me to add some details to the description. The spores were slightly longer than I had previously found.

Recently *B. auripes* Pk. has been recorded from Japan by Hongo (1970) whose description of the species, as it occurs in Japan, reads extremely like that of *B. sinapicolor*. He describes the yellow tomentose base of the stem but the yellow colour of the fruit-body does not seem to be the uniform and striking mustard-yellow of *B. sinapicolor*. In contrast, for North American specimens of *B. auripes*, the mycelium at the base of the stem is given as white (Snell and Dick 1970) and it is not figured or described as yellow by Coker and Beers (1943). But these authors describe, and Hongo finds in the Japanese material, the immature pores as stuffed and covered, as it were, by a membrane. This is the nature of the young pores in *B. phaeocephalus* to which I considered *B. sinapicolor* to be allied (Corner 1972, p. 125), but I have not seen this membrane in *B. sinapicolor*, though I have had young specimens. Here is evidently a close alliance in which the Japanese *B. auripes* approaches *B. sinapicolor*.

B. thibetanus Pat.

Pileus —8 cm wide. Stem —10 cm high. Pores 0.5 mm wide, golden citrine. Spores 10.5–13(–14) × 4.5–5.5 μ , olive brown turning dark fuscous brown in potash.

Sarawak, Bako National Park, solitary in humus, Corner P-157, 26 Aug. 1972.

This characteristic species was recognised at once in the forest but microscopic examination of the dried material some months later revealed a point which may be peculiar or, hitherto, overlooked. The spores of the Sarawak collection, which were slightly larger than the Malayan, turned rather dark fuscous brown in potash. Dried spores of the Malayan material (now thirty years old) are very pale in potash.

B. xylophilus Petch

Malaya, Kuala Lumpur, Lake Garden, on earth in the centre of an isolated clump of the palm *Oncosperma*, Corner s.n. 3 Sept. 1972.

subgen. *Leccinum* S. F. Gray

B. peronatus sp. nov. — Figure 1c.

Pileus 6–9 cm, siccus, obscure brunneus villoso-subtomentosus, dein ochraceo-brunneus. Stipes 7–8.5 cm × 9–12 mm, subcylindricus v. subfusiformis, basim versus attenuatus, albidus dein subochraceus, annulis floccosis in squamulis 1–2 mm projicientibus fuscous irreguliter peronatus, haud reticulatus; mycelio albo. Tubi 6–9 mm longi, adnexi, subliberi, cremeo-albi dein olivaceo-virides; poris minutis, tubis concoloribus, aetate brunnescens. Caro 10–16 mm crassa, albida dein subflavida, aetate vel fractu tarde ochraceo-brunnescens, haud cyanescens. Odor subacidus. Sporae 8.5–11 (12) × 3.7–4.7 μ , in cumulo olivaceae, laeves.

Ad humum in silva, solitarius v. caespitosus. Sarawak, Bako National Park, Corner P-142 (typus, CGE) P-144, 25 Aug. 1972.

Pileus 6–9 cm wide, convex then plane, dry, at first dark fawn brown and villoso-subtomentose, then brownish ochraceous with fuscous brown centre, paler to the margin, tomentose, becoming minutely cracked, especially in the centre; without veil. Stem 7–8.5 cm × 9–12 mm, subcylindric or subfusiform —15 mm wide in the middle, usually attenuate at the base, whitish then pallid ochraceous buff, irregularly peronate with more or less interrupted, divergent, floccose bands projecting 1–2 mm in the middle of the stem and often appearing as connate squamules, the bands becoming fuscous brownish, stem-apex smooth, not reticulate; mycelium white, fibrillose. Tubes 6–9 mm long, adnexed, nearly free, subventricose, pale cream-white then pale greenish olivaceous; pores minute, concolorous with the tubes then brownish with age. Flesh 10–16 mm thick in the centre of the pileus,

white then pale yellowish white, becoming pale brownish subochraceous in the stem and pale brownish or pinkish brown with age or on exposure in the pileus, not cyanescent or truly rufescent. Smell slightly sour.

Spores olive in the mass. Basidia 26–30 × 9–10 μ ; sterigmata 4, 4–5 μ long. Cystidia not seen; pore-edges more or less gelatinised without cellular structure. Surface of the pileus composed of more or less divergent (–70 μ) or appressed, laxly interwoven, uninflated hyphae 3–6 μ wide with slightly thickened walls, not encrusted, not as a pile. Surface of the stem sterile except the stem-apex, composed of narrow longitudinal hyphae 3–6 μ wide divergent in massive array to form the peronate scales or annuli; hyphal ends in the scales uninflated or as small clavate end-cells 40 × 12 μ , as vesicular cells 16 μ wide, or subfusiform but not set in a regular layer; internal hyphae of the stem 14 μ wide, longitudinal, without clamps, often secondarily septate, at the base of the stem 3–8 μ wide with slightly thickened walls, very compact, without chlamydospores. Tube-trama phylloporoid, composed of longitudinal hyphae 4–8 μ wide, gradually divergent, rather firmly gelatinous and somewhat swollen in alcohol-formalin.

This species is distinguished by the peronate scales of the stem. In the collection P-144 it seemed that they are formed by the cracking of the stem-surface, but in P-142 they were firm as massive outgrowths of hyphae though evidently spaced peronately by the elongation of the stem. In this respect the species resembles *B. borneensis* Corner (1972, p. 106), which differs in the richer colour, cyanescent flesh, longer spores and boletoid tube-trama. Possibly *B. peronatus* is related with *B. graveolens* Corner. On stem-character the species belongs in subgen. *Leccinum*. It will go in the artificial key to Malasian boleti in Group G (Corner 1972, p. 50) after *B. sylvestris*. Compare the following species with yet shorter spores.

B. squarrosipes sp. nov. — Figure 1d.

Pileus 7 cm, viscidus, pallide cervino-brunneus. Stipes 6 cm × 12 mm, siccus, concolor, squamulis brunneolis furfuraceo-squarrosus; mycelio albo. Tubi 6 mm longi, sinuati, pallide flavo-virides; poris 0.5–0.8 mm, tubis concoloribus. Caro alba immutabilis. Sporae 6–7.5 (–8) × 5–6 μ , in cumulo olivaceo-brunneae, laeves.

Ad humum sub arboribus. Malaya, Selangor, Kepong, Corner P-191 (CGE) 1 Sept. 1972.

Pileus 7 cm wide, plane, smearable-viscid, pale fawn brown. Stem 6 cm × 12 mm, rather stout, fibrous, dry, pale fawn brown, in the upper two-thirds coarsely squaroso-furfuraceous with pale brown particles or squamules; mycelium white. Tubes 6 mm long, sinuate, pale greenish yellow; pores 0.5–0.8 mm, pale greenish yellow. Flesh white, yellowish above the tubes, in the stem brownish, unchanging.

Spores olive brown in the mass, 1-guttate, smooth. Basidia 25–30 × 9.5–11 μ , 4-spored. Cystidia 46 × 7–11 μ , fusiform subventricose with the apex 3–4 μ wide, thin-walled, sparse on the pore-edges and on the tube-surfaces. Surface of the pileus composed of appressed hyphae 3–8 μ wide with mucilaginous walls and brown sap, with scattered larger hyphal ends 9–18 μ wide (as if relics of a pile of hyphal ends). Surface of the stem with the squarrose particles consisting of the narrow superficial hyphae of the stem divergent in tufts and bearing a dense patch of sterile hymenium composed of clavate cells and subventricose cystidia 55 × 11 μ , rarely with fertile basidia, and with occasional larger and shortly septate hyphal ends with the cells 20–45 × 9–13 μ (as the larger hyphal ends on the pileus). Hyphae of the stem 18 μ wide, longitudinal, without clamps. Tube-trama subboletoid, rather soft and sloppy in alcohol-formalin, with longitudinal hyphae 9 μ wide.

This fungus, like the preceding, recalls *B. borneensis*. Compare, however, *B. lubricus* with viscid umber pileus, merely pruinose stem, and larger spores. *B. squarrosipes* will go in Group C of the artificial key to Malaysian boleti (Corner 1972, p. 42) next to *B. lubricus*.

subgen. *Punctispora* subgen. nov.

Statu ut in subgen. *Boletello*. Sporae in cumulo olivaceo-brunneae, elongato-ellipsoideae, verrucis v. echinulis in exosporio hyalino praeditae. Tubi adnexit ventricosi v. subliberi, olivacei v. flavidii dein olivacei; trama plus minus phylloporoidea. Stipes reticulatus v. sublacunoso-reticulatus. Hyphae sine fibulis. Typus, *B. punctisporus* sp. nov.

This subgenus may be described as *Boletellus* with internally verrucose, not striate, spores. It is based on the following species *B. punctisporus* from Sarawak, which turns out to be an unexpected ally of the North American *Boletus betula* Schw. The fruit-bodies of *B. punctisporus* combine the characters of several subgenera or genera. They have the long, red, reticulate stems of *Heimiella*, the marginal flange or veil of the pileus so conspicuous in subgen. *Austroboletus* and *Boletellus*, and the yellow to olivaceous tubes with olive-brown spores of *Heimiella*, *Boletellus* and *Boletus* s. str.

Microscopically the spores have distinctive markings, caused by internal papillae in the exospore, such as have been described for *B. betula* by Singer (1945), Snell and Dick (1970), and Grand and Moore (1971). The same markings occur in subgen. *Austroboletus* but its spores are purple-brown or vinaceous and its tubes, which lack the yellow and olive colours, have the mucilaginous boletoid trama.

For *B. betula*, now usually referred to *Boletellus*, there is already the special section *Allospori* Singer. The discovery of *B. punctisporus* shows that the two species are part of an alliance equivalent to *Boletellus* (striae spores) or *Austroboletus*, within which sect. *Allospori* is distinguished by the viscid pileus without marginal veil. Two other species may belong. *Boletellus purpurascens* Heinem. of the Congo and *B. schichianus* (Teng et Ling) Teng of China have verrucose spores. The illustration of the spore of *Porphyrellus subflavidus* (Murr.) Singer, given by Grand and Moore (1971), is like that of *B. betula* but the end of the spore is smooth as in subgen. *Austroboletus*, and the tubes and spores of this species evidently lack the olive colour; hence I retained it in subgen. *Austroboletus* where it fits closely (Corner 1972).

B. punctisporus sp. nov. — Figure 1b.

Pileus —6 cm latus, convexus, siccus, villosus, fusco-brunneus, dein in squamulis cuti-fractus: margine primo ut membrana floccosa —10 mm lata tubos excedenti, dein e pileo exscisso et ad stipitem annuliformi collapso. Stipes —11.5 cm × 12 mm, ad basim 7 mm latum attenuatus v. basi subdiscoideo, plerumque elongato-reticulatus, furfuraceus, purpureo-ruber, basim albovillosum versum laevis brunneus. Tubi —17 mm longi, adnexit, ventricosi, olivacei; poris 0.5–0.8 mm, olivaceis. Caro 9–10 mm crassa, flavidula, sub superficie pilei stipitisque rubra, supra tubos subcyanescens. Sporae 14–19 × 7–8 μ , in cumulo olivaceo-brunneae, membrana hyalina punctata inclusae, ad apicem porosae, endosporio 0.7 μ crasso colorato, nec alatae nec striatae, apiculo 0.5 μ longo.

Sarawak, Bako National Park, leg. E. J. H. Corner P-154, 25 Aug. 1972, P-154A (typus CGE) 28 Aug. 1972.

Pileus —6 cm wide, convex, dry, villous, snuff-brown or fuscous brown, then cracked into small squamules; margin exceeding the tubes as a floccoso-membranous flange —10 mm wide, splitting from the pileus and collapsing as a ring on the stem. Stem —11.5 cm × 12 mm, attenuate to the base 7 mm wide or the base slightly

dilated and subdiscoid, rather dull purplish red, with a concolorous reticulum of shallow and narrow, elongate meshes, rough with scurfy purple-red flecks scattered on the reticulum, smooth and brownish near the white villous base; mycelium white. Tubes 17 mm long, adnexed, ventricose, dull olive; pores 0.5–0.8 mm wide, dull olive. Flesh 9–10 mm thick in the centre of the pileus, pale yellow, over the tubes deeper yellow and slightly cyanescent on exposure, dull red below the surface of the stem and pileus, not otherwise cyanescent or rufescent.

Spores olive-brown in the mass, ellipsoid, obtuse, the hyaline exospore surrounding the brown ovoid endospore (11–15 \times 6–7 μ) and pierced by fine processes appearing as hyaline dots on the surface of the exospore, the endospore-wall 0.7 μ thick, 1–2-guttate, apiculus 0.5 μ . Basidia 14–16 μ wide, pyriform clavate; sterigmata 4. Cystidia ? lanceolate-ventricose, as the caulocystidia, but sparse. Surface of the pileus with a thick pile 200 μ high, eventually disrupted into squamules composed of more or less moniliform hyphae with cells 25–75 \times 8–19 μ , the end-cells subclavate or subventricose. Stem with a more or less disrupted hymenium of fertile and, mostly, sterile basidia, with scattered projecting, lanceolate or subventricose, thin-walled cystidia 60 \times 7–10 μ . Hyphae of the stem 15 μ wide, secondarily septate, without clamps. Tube-trama more or less phylloporoid.

In the forest this species may be mistaken for *Heimiella retispora* or *H. subretispora*, which lack the marginal flange or veil of the pileus. In the collection P-145A the base of the stem was subdiscoid as in various species of *Boletellus*.

subgen. *Tylopilus* Karst.

B. ballouii Pk. var. *fuscatus* Corner (1972) p. 194.

Sarawak, Bako National Park, Corner P-173, 27 Aug. 1972.

B. coccineinanus Corner (1972) p. 152.

Java, Sukabumi district, Tjiletuh, Corner J-21, 29 April 1972, scattered singly along an earth-bank at the edge of the forest, but not infrequent.

These specimens differed from the Malaysian merely in the red-brown, rather than crimson, pileus, the wider stem (1.5–2 mm), the slightly redder pores (crimson when young, fading on expansion), and the yellow (not orange-yellow) mycelium. The spores under the microscope were pale ochraceous without olive tint. The tubes were white, then pink, without a yellow or olive tint.

B. longipes Mass.; Corner (1972) p. 165.

Sarawak, Bako National Park, Corner P-143, P-143A, P-143B, P-143C, 25–28 Aug. 1972.

This was a common species, either solitary or occasionally in small troops, both in the dipterocarp forest and in the *kerangas*-forest of the plateau. The spores had in all the collections the characteristic blood-red colour in the mass, and the blackening with potash, but there were differences in size; in P-143B the spores were typical, 11.5–16 \times 4.5–5.3 μ ; in P-143A and P-143C they were 12–14 \times 4.5–5.7 μ ; in P-143 they were 10–13 \times 4.5–5.2 μ . I did not find var. *latisporus*.

The reticulations of the stem become more pronounced in older specimens. On most the longer ventricose caulocystidia become slightly but distinctly thick-walled at the base.

var. *alba* var. nov.

Receptacula alba; tubis porisque maturis pallide olivaceis, dein subroseis. Sporae 12.5–16 \times 4.2–4.5 μ , in cumulo purpureo-vinaceae, in KOH nigrescentes.

Sarawak, Bako National Park, Corner P-184 (CGE) 28 Aug. 1972, ad humum in silva *kerangas*.

Pileus 6–9.5 cm. Stem 4–6.5 cm \times 7–10 mm above, 12–16 mm at the base, wholly shallowly and irregularly reticulate, the meshes elongate in the lower part of the stem. Tubes 7–12 mm long; pores 1–1.5 mm wide.

About 30 fruit-bodies were found scattered in one patch of the *kerangas* forest. They differed from typical *B. longipes* only in being pure white, except for the maturing tubes and pores. The tube-trama was boletoid with narrow, compact, medullary hyphae 2.5–5 μ wide, and more mucilaginous cortical hyphae 4–8 μ wide. The trama remained firmly gelatinous in alcohol-formalin.

B. nanus Mass.; Corner (1972) p. 150.

Sarawak, Bako National Park, scattered in small groups in *kerangas* humus, 26 Aug. 1972.

B. tristior sp. nov.

Pileus 5–8 cm latus, convexus dein planus v. concavus, siccus, fuligineo-umbrinus dein sordide brunneo-umbrinus, minute pruinoso-velutinatus et cutifractus. Stipes 3–5 cm \times 10–15 mm, subventricosus, subconcolor, ex integro minute fuscobrunneo-pruinosis, ad basim mycelio albo villosus, haud reticulatus. Tubi 11 mm longi, adnexi, ventricosi, fere liberi, pallide griseo-rosei; poris 0.5–0.8 mm latis, pallide roseis. Caro 8–10 mm crassa, alba firma immutabilis. Odor subnullus. Sporae 9.5–12.5 (–16) \times 3.5–4.2 μ , in cumulo pallide roseae, laeves.

Ad humum, solitarius, sparsus. Sarawak, Bako National Park, Corner P-156, 26 Aug. 1972.

Basidia 28–33 \times 9–10 μ ; sterigmata 4. Cystidia 40–85 \times 6–18 μ , more or less ventricose, obtuse, not distinctly appendaged, thin-walled, multiguttulate, not red-brown in potash, frequent on the tube-surface and pore-edges. Surface of the pileus with a very short and compact pile 45–65 μ high, composed of 1–3-septate hyphae 4–12 μ wide, the cells 7–33 μ long, with brown walls, cylindric or submoniliform. Stem-surface with an interrupted and more or less sterile hymenium of clavate cells 16–28 \times 4.5–12 μ and subventricose cystidia 60 \times 7–10 μ . Hyphae of the stem 12 μ wide, secondarily septate, without clamps; at the surface of the stem 2.5–5 μ wide, very compact, with slightly thickened walls. Tube-trama subboletoid, with a medulla of narrow hyphae, the larger hyphae 10 μ wide and scarcely divergent, little swollen and rather firm in alcohol-formalin.

This species strongly recalls *B. albo-ater* Schw. but the tubes are strongly ventricose and the tissue is not rufescent-nigrescent. It comes near to *B. funerarius* Mass. which has a rich brown pileus and stem, shorter spores, and a strong smell; both have the firm flesh, particularly at the surface of the stem. In the key to *Tylopilus* for Malaysian boleti (Corner 1972, p. 147) the species comes after *B. cervicolor*.

B. viridis (Heinem. et Gooss.) Corner (1972) p. 197.

Pileus with small, pale olivaceous grey squamules under the gluten, crowded over the centre. Stem 3–4 cm \times 5–7 mm above, 5 mm at the base, cylindric or attenuate downwards, at first white and pale fuscous olivaceous pruinose, then viscid; mycelium white. Tubes 6–8 mm long, sinuate-adnate, pale pinkish ochra-

ceous; pores pale pinkish ochraceous. Spores 11.5–15 (–17) $4\text{--}4.7\mu$, -5.5μ wide in P-153B, in the mass fuscous ferruginous or tinted ochreous, golden brown under the microscope. Cystidia not seen. Trama boletoid.

Sarawak, Bako National Park, solitary in humus, Corner P-153, 26 Aug. 1972, and P-153A, 28 Aug. 1972. — Malaya, Pahang, Fraser's Hill, Corner P-153B, 6 Sept. 1972.

There are slight differences from previous Malayan collections, such as the squamules under the viscid layer of the pileus, the stem at first pruinose then viscid (as in *B. thibetanus*), and the colour of the tubes and pores. The species has some similarity with *B. nanus* Mass.

subgen. *Xerocomus* (Quél.) Konrad

B. albipurpureus sp. nov.

Pileus 7 cm latus, convexus (vix matus), siccus, minute villoso-subtomentosus, purpureo-brunneus. Stipes $11\text{ cm} \times 15\text{ mm}$, subcylindricus, in parte superiori longitudinaliter rugulosus, haud reticulatus, ex integro minute furfuraceo-pruinosis, concolor vel basim versus fuscobrunneus; mycelio albo. Tubi 10 mm longi, sinuato-adnati, pallide olivacei; poris $0.5\text{--}1\text{ mm}$ latis, pallide flavidoolivaceis. Caro alba, sub superficie pilei purpureo-brunnea, immutabilis. Sporae $14\text{--}20 \times 5.5\text{--}6\mu$, in cumulo olivaceo-brunneae, boletoideae, laeves, (an laevissime striatae?).

Ad humum in silva, solitarius. Sarawak, Bako National Park, Corner P-155, 26 Aug. 1972 (CGE).

Basidia $32\text{--}43 \times 11\text{--}12.5\mu$; sterigmiata 4. Pleurocystidia $67\text{--}105 \times 16\text{--}25\mu$, ventricose with a rather short and obtuse or subcapitate appendage $25 \times 7\text{--}10\mu$, thin-walled, copious. Surface of the pileus with a more or less interrupted pile of cylindric or submoniliform hyphal ends 270μ long, the cells $20\text{--}90 \times 5\text{--}11\mu$, with slightly thickened and thinly encrusted walls. Surface of the stem with a disrupted hymenium of fertile and sterile basidia, scattered ventricose cystidia often larger than the pleurocystidia with the apex 18μ wide, and numerous filiform hyphal ends $80 \times 3\text{--}5\mu$ with the tips 2μ wide. Hyphae of the stem 16μ wide, often secondarily septate, without clamps. Tube-trama subboletoid with a narrow medulla of narrow hyphae, the wider hyphae (12μ wide) scarcely divergent, little swollen and rather firm in alcohol-formalin.

This species comes in the close affinity of *B. ferruginospora* Corner, *B. raphanolens* Corner and *B. variisporus* Corner. It differs in the larger fruit-body with purple-brown pileus and stem, the rugulose stem, and the stout pleurocystidia. The spores agree best with those of *B. raphanolens* which has yellowish flesh and mycelium and rugulose-reticulate pileus. It keys out in Group G (Corner 1972, p. 49) with *B. variisporus*.

B. destitutus Corner (1972) p. 227.

The following collection of a single specimen I refer to this species for convenience. It keys out to *B. destitutus* but the wider spores and richer colouring of the pileus, though not the small fruit-body, suggest *B. satisfactus*. In the study of these small species it is difficult to know, as yet, what are the more critical points, whether the size of the fruit-body, the length or width of the spores, or the cyanescence of the flesh are the more reliable characters than, say, colour or attachment of the tubes. It may be that this collection is a new species with small, richly coloured fruit-body and short wide spores.

Malaya, Penang Hill, 300 m alt., Corner P-68, 29 July 1972, solitary on a bank in the forest. — Pileus 22 mm wide, convex, villous to minutely scurfy velutinate, ferruginous fawn or fulvous cinnamon. Stem 12 × 3.5 mm, attenuate downwards, pale brownish, apex slightly yellowish, minutely pruinose; mycelium white. Tubes sinuato-adnate, pale dingy olivaceous buff; pores small concolorous. Flesh 3 mm thick in the centre of the pileus, pale yellowish white; no part cyanescence.

Spores 6.7–8 (–9) × 5.5–6.2 (–6.7) μ , fuscous olivaceous under the microscope, ovoid, smooth, 1-guttate. Basidia c. 30 × 10–11 μ , 4-spored. Cheilocystidia as sterile basidia. Pleurocystidia ? (not seen). Surface of the pileus with a pile of submoniliform hyphal ends 250 μ long, some 400 μ long, with the cells 18–60 × 8–18 μ , the end-cells obtuse and subclavate. Surface of the stem with a disrupted sterile hymenium of clavate cells 20–34 × 7–12 μ , with scattered narrow excrescent hyphal ends 3–5 μ wide. Hyphae 23 μ wide in the stem, without clamps. Trama phylloporoid, with hyphae 3–14 μ wide.

B. nugatorius Corner (1972) p. 224.

I refer here with doubt the following Javanese collection. It has the spores and wide superficial hyphae of the pileus of *B. junghuhnii* but lacks the red colour in the stem and the cyanescence of the pores. In shape and colour of the fruit-body, but neither in its size or viscid pileus, it recalls *B. thibetanus*.

Java, Tjibodas, Corner J-6, 11 April 1972, solitary on the ground in the forest. — Pileus 3 cm wide, convexo-plane, dry, finely tomentoso-villous, purplish brown, then minutely cracked with the yellow flesh showing. Stem 4 cm × 4 mm, attenuate upwards, pale brownish yellowish, minutely yellowish scurfy; mycelium white. Tubes adnexed, olive-yellow; pores 0.3–0.5 mm wide, angular, unequal, yellow to olive. Flesh pale yellow, no part cyanescence.

Spores 10.5–12 × 4.5–5 μ , pale ochraceous under the microscope. Cystidia ventricose, not appendaged, 11–20 μ wide, thin-walled, scattered in the tubes. Surface of the pileus with a pile 180 μ high, composed of moniliform hyphal ends with cells 20–50 × 12–30 μ , the end-cells subclavate and obtuse. Surface of the stem with a disrupted sterile hymenium, no ventricose cystidia seen. Tube-trama phylloporoid.

B. setigerus sp. nov. — Figure 1a.

Pileus 15 mm latus, siccus, tomentosus, livido-ochraceus. Stipes 15 × 2 mm, fibrillosus, haud reticulatus, pallide ochraceous: mycelio albo. Tubi 3 mm longi, sinuati, albi dein flavidii; poris 0.5 mm latis, flavidis. Caro 4 mm crassa, alba immutabilis. Sporae 6.8–8.3 × 4.5–5 μ , ochraceo-incarnatae s.m., laeves. Pleurocystidia 110 × 11–25 μ , ventricosa, obtusa, crassitunicata. Superficies pilei ex hyphis angustis appressis instructa.

Ad ripam juxta silvam, solitarius. Java, Sukabumi distr., Tjiletuh, Corner J-29 (CGE), 30 April 1972.

Pileus convex, dry, opaque, thinly subtomentose, pale livid ochraceous. Stem slightly thickened to the base 3.5 mm wide, pallid ochraceous buff, then pale fuscous from the base upwards. Flesh slightly yellowish in the stem.

Spores pale pinkish subochraceous under the microscope, ellipsoid obtuse, even subreniform, smooth, 1–2-guttate, slightly darker in Melzer's iodine. Basidia 33–42 × 9.5–11 μ , 4-spored. Cheilocystidia 40–65 × 7–12 μ , fusiform to subventricose with obtuse, not prolonged, apex 3–6 μ wide, the walls 0.5–1.5 μ thick in the free part of the cystidium but not at the apex. Pleurocystidia 110 × 11–25 μ , ventricose with obtuse, not prolonged, apex 6–9 μ wide, varying subfusiform but

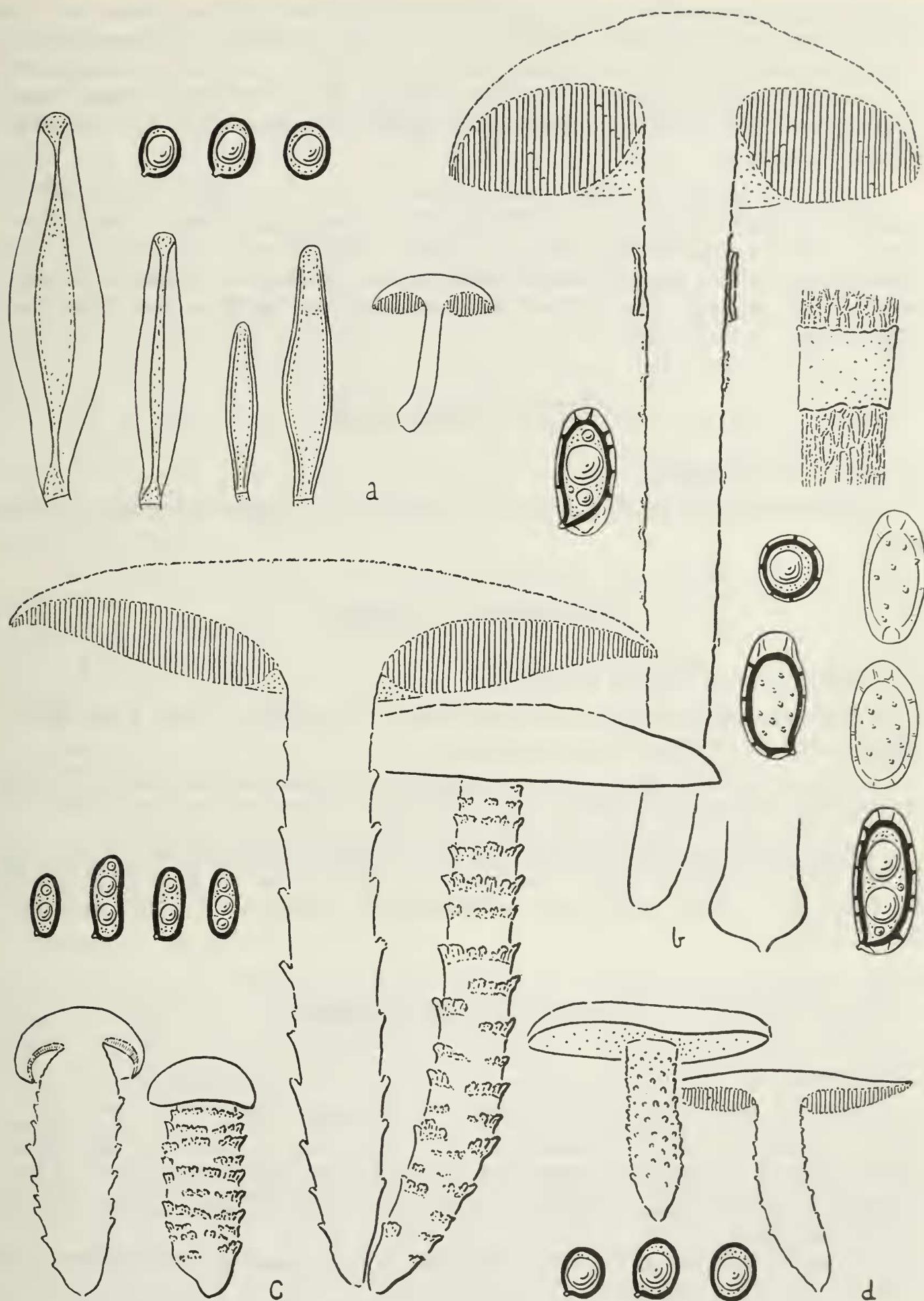


Figure 1. a, *Boletus setigerus*, with pleurocystidia (very thick-walled) and cheilocystidia. — b, *B. punctisporus*, in section and with the annulus in surface-view on the reticulate stem. — c, *B. peronatus*. — d, *B. squarrosipes*. Fruit-bodies $\times 1$, those of *B. squarrosipes* $\times \frac{1}{2}$; spores $\times 1000$, the coloured wall in black; cystidia $\times 500$.

always obtuse, the wall very strongly thickened, the lumen narrow, projecting, the subhymenial base $5-7\mu$ wide and thin-walled but not dilated, with transitions to the cheilocystidia near the pore-edges. Surface of the pileus composed of appressed, interwoven, uninflated hyphae $3-6\mu$ wide, without a pile of hyphal ends. Tubertrama with rather toughly mucilaginous longitudinal hyphae 12μ wide. Hyphae without clamps.

This small species of pallid colour seems near to *B. aculifer* Corner and *B. hastulifer* Corner, and to the much larger *B. olivaceiluteus* Corner (with acute cystidia), but all these have a conspicuous pile of hyphal ends on the pileus. The colour of the spores suggest that *B. setigerus* may belong in subgen. *Tylopilus*. With these doubts, the species comes at the end of the key to Group I of Malaysian boleti (Corner 1972, p. 52).

GYROPORUS Quél.

G. castaneus (Fr.) Quél.

Java, Sukabumi district, Lengkong, Corner s.n. 29 April 1972, solitary in the forest.

HEIMIELLA Boedijn

H. retispora (Pat. et Baker) Boedijn

Pileus rose-red, then paler and brownish red on expansion. Flesh lurid yellow, orange-yellow in the stem, not cyanescence.

In humus of dipterocarp forest, gregarious in compact troops. Sarawak, Bako National Park, Corner P-160, 26 Aug. 1972, and P-160A, 28 Aug. 1972.

These specimens were typical except for the lack of cyanescence. I think that *H. japonica* is at most a variety. One has to be careful now not to mistake this in the forest for *Boletus punctisporus* with marginal flange to the pileus and pale yellow flesh.

PHYLLOPORUS Quél.

P. squamosus sp. nov.

Pileus 6-8 cm, convexo-planus, siccus, tomentosus, purpureo-brunneus dein fusco-cervinus et squamulis fibrilloso-fasciculatus. Stipes 5-6 cm \times 7-9 mm, subcylindricus, cervino-brunneus, ex integro brunneo-pruinosus; mycelio albo. Lamellae alte decurrentes, confertae, alte et late poroideo-anastomosae, albidae dein pallide brunneae. Caro 6-8 mm crassa, albida dein flavidula, in stipite brunneola, immutabilis. Sporae 8.3-10.3 \times 4.5-5.3 μ , in cumulo ochraceo-brunneae, laeves. Cystidia 50-128 \times 14-20 μ , copiosa, tenuiter tunicata. Hyphae sine fibulis.

Ad humum sub *Quercu*. Sarawak, Bako National Park, Corner P-141 (CGE), 25 Aug. 1972.

Pileus 6-8 cm wide, convex then plane, not umbonate, dry, brown tomentose tinged purple, then fuscous fawn and splitting into fibrilloso-fasciculate squamules larger in the centre and smaller towards the subtomentose margin. Stem 5-6 cm \times 7-9 mm, subcylindric or slightly tapered downwards, or flattened -11 mm wide, fawn brown, wholly minutely brown pruinoso-subfurfuraceous, weathering smooth, base thinly white villous. Gills deeply decurrent, rather crowded, 27-30 primaries

6–8 mm wide, 3–4 ranks, not dichotomous, becoming deeply and widely poroid from the stem to the outer part of the limb with transverse and oblique ridges forming meshes 2–4 mm wide radially, the reticulations not reaching the gill-edges, thus persistently lamellate with deeply poroid-reticulate interstices, whitish then rather pale fawn brown. Flesh 6–8 mm thick in the centre of the pileus, spongy, pallid white tinged yellowish, in the stem pale brownish, not changing colour on exposure or bruising.

Spores not darkening in potash. Basidia 34–40 \times 9.5–11 μ ; sterigmata 4, 4.5 μ long. Cystidia 50–128 \times 14–20 μ , cylindric to subventricose, apex obtuse, projecting, thin-walled, abundant on the gill-surface and along the fertile edge. Surface of the pileus with a disrupted pile of hyphal ends 800 μ long, forming the fibrillose squamules, composed of subcylindric rows of cells 23–85 \times 8–18 μ , the end-cells obtuse or more or less attenuate (even subappendaged), with brown contents and thin brown incrustation. Surface of the stem covered with a disrupted sterile hymenium of subclavate and immature basidia and rather scattered cystidia (as on the gills). Hyphae of the flesh 3–18 μ wide, without clamps; longitudinal in the stem with the cells 25–120 μ long, 3–6 μ wide at the surface of the stem, and with somewhat thickened walls in the interior of the stem. Gill-trama with mucilaginous longitudinal hyphae 5–15 μ wide.

This species with such deeply alveolate-reticulate gills comes in size of fruit-body between the Malayan *P. ochraceobrunneus* Corner (1970) and the north temperate *P. rhodoxanthus* (Shw.) Bres.; it differs from both in the pallid (not yellow) gills, the squamulose pileus, and the short spores. It may be closer to the Malayan *P. bellus* (Mass.) Corner which has the small spores, also pale under the microscope, a merely villous-subtomentose pileus, and yellow gills reticulate only at the base. The North American *Boletinus squarrosoides* Snell et Dick (Mycologia 28, 1936, 468), referred later to *Phylloporus* and now to *Xerocomus*, may also be related; it differs in the more or less reticulate yellow stem, yellow gills poroid in the outer part of the pileus, and the narrow spores (7–10 \times 3.5–4.5 μ). Compare, also, *Paxillus squarrosus* McNabb (1969) with dichotomous, not poroid, gills and rufescent flesh.

P. stenosporus sp. nov.

Pileus 4 cm latus, siccus, subtomentosus v. fere laevis, pallide cervino-brunneus, aetate subgriseus. Stipes 22 \times 7 mm, basim versus attenuatus, brunneo-albidus, ex integro albido-pruinosus; mycelio albo. Lamellae decurrentes, subdistantes, primariae c. 30, 3–4 mm latae, ordinibus 3–4 instructae, nec reticulatae nec dichotomae, flavidae. Caro crassa, albida, in stipite brunneola, immutabilis, Sporae 9.5–11.5 (–12.5) \times 3.7–4.2 μ , ochraceae s.m., laeves, 2–3-guttatae. Cystidia 60–120 \times 14–20 μ , tenuiter tunicata, copiosa.

Ad ripam juxta silvam, solitarius. Java, Sukabumi distr., Tjiletuh, Corner J-23 (CGE), 29 April 1972.

Spores narrowly boletoid, not amyloid, not darkening in potash. Basidia 9–10 μ wide, 4-spored. Cystidia 60–120 \times 14–20 μ , ventricose with slightly prolonged obtuse apex 6–9 μ wide, varying clavate or subcylindric, tapered into the narrow subhymenial base, abundant on the gill-surface and edge. Surface of the pileus evidently with a pile of inflated hyphal ends 170 μ long when young, but the pile becoming flattened and disorganised with age, the hyphae cylindric or, if short-celled, then submoniliform, the cells 18–120 \times 8–17 μ , the end-cells obtuse. Stem with a disrupted sterile hymenium. Hyphae 8–20 μ wide, without clamps.

The pale narrow spores distinguish this species which seems near to the slender *P. brunneolus* Corner (1970) which has rufescent flesh and slightly cyanescence gills.

STROBILOMYCES Berk.

S. velutipes Cke et Mass.

Pileus with appressed scales. Stem reticulate only at the apex. Flesh slowly turning red then black.

Sarawak, Bako National Park, Corner P-159, 26 Aug. 1972; Semanggoh Forest, Corner s.n., 19 Aug. 1972.

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